

Patent claims

1. A method for altering design data for producing a component, particularly an integrated circuit arrangement,

in which design data are prescribed (302) which stipulate a geometrical design (10) which is to be altered for a component,

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in which the design data are used to produce altered design data which are stored (308) and stipulate a geometrical design (10a) which is altered locally in comparison with the geometrical design (10) of the design data,

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in which the altered design data (10a) are used to ascertain (312) an assessment criterion (BM1, GBM) for the altered design (10a),

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in which the assessment criterion (GBM) for the altered design (10a) is compared (314) with an assessment criterion (BM1, GBM) for the design (10) which is to be altered,

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and in which the unaltered design data are retained or replaced (316, 318) with the altered design data depending on the comparison result,

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with a plurality of cycles of alterations, comparisons and decisions about replacement being performed automatically.

2. The method as claimed in claim 1, characterized in that a region (100) for the local alteration and/or the size of this region (100) is/are ascertained without using a random function,

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or in that a region (100) for the local alteration and/or the size of this region is/are ascertained using a random function.

5 3. The method as claimed in claim 1 or 2, characterized in that a region (100) for the local alteration and/or the size of this region (100) is/are selected on the basis of an even distribution or by favoring regions and/or sizes which particularly impair
10 the alteration of the assessment criterion (GBM) toward the aim of the method.

4. The method as claimed in one of the preceding claims, characterized in that a region (100) is
15 selected for producing the altered design data (10a) in the design stipulated by the design data which are to be altered,

in that design data are ascertained which relate to the
20 design in the selected region (100),

and in that the ascertained design data are altered on the basis of a prescribed function which brings about a geometrical alteration of the design in the selected
25 region.

5. The method as claimed in claim 4, characterized in that the geometrical alteration is relocation (308) of a design part in the region (100) by a prescribed
30 distance or by a prescribed number of points of a grid dimension and in a prescribed direction,

and/or in that the geometrical alteration is mirror imaging of a design part in the region (100) on a
35 prescribed mirror axis,

and/or in that the geometrical alteration is rotation

of a design part in the region (100) about a prescribed center of rotation and through a prescribed angle of rotation,

- 5 and/or in that the geometrical alteration is uniform or nonuniform expansion or contraction of a design part in the region (100) in at least one prescribed direction and by at least one prescribed scaling factor,
- 10 and/or in that the geometrical alteration relates to smoothing of lines of a design part in the region (100),

- and/or in that the geometrical alteration is
15 replacement of the design part in the selected region (100) with a design part from another region of the design or with a prescribed design part or with a corresponding design part of a design from an earlier cycle of the method, the corresponding region being
20 situated at the same location in the design as the selected region or having a similar geometry to the selected region,

- and the corresponding region preferably being a region
25 from the best design ascertained in the method to date,

- and/or in that the geometrical alteration brings about a change to the total area of the changed design (10a) in comparison with the total area of the design (19)
30 which is to be changed.

6. The method as claimed in claim 4 or 5, characterized in that at least one stipulation for the geometrical alteration is ascertained using a random
35 function.

7. The method as claimed in one of the preceding

claims, characterized in that the ascertainment of the assessment criterion involves ascertaining (310) a critical area for short circuits, which area is ascertained for the altered design or region (100),
5 and/or a critical area for interruptions, which area is ascertained for the altered design (10a) or in the region (100),

and/or in that the ascertainment of the assessment
10 criterion involves ascertaining the number of corners (E1 to E4) or the number of edges (110 to 120) in the altered design (10a) or in the region (100),

and/or in that the ascertainment of the assessment
15 criterion involves ascertaining the current-carrying capacity (D) of at least one structure which is to be produced using the design (10, 10a),

and/or in that the ascertainment of the assessment
20 criterion involves ascertaining the coupling capacitance between an element of an integrated circuit arrangement which is to be produced and at least one structure which is to be produced using the design (10, 10a),

25 and/or in that the ascertainment of the assessment criterion involves ascertaining the overlap (U) between an element of an integrated circuit arrangement which is to be produced and at least one structure which is
30 to be produced using the design (10, 10a),

and/or in that the ascertainment of the assessment criterion involves calculating the total area of the changed design (10a).

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8. The method as claimed in one of the preceding claims, characterized in that the assessment criterion

is an overall assessment criterion (GBM) which is ascertained from at least two different assessment criteria (BM1, BM2),

- 5 and/or in that weighting factors (W1, W2) with different values are prescribed and are used for weighting the assessment criteria (BM1, BM2) when ascertaining the overall assessment criterion (GBM).
- 10 9. The method as claimed in one of the preceding claims, characterized in that a decision about retaining and/or replacing the unaltered design data is made (316, 318) on the basis of a random function.
- 15 10. The method as claimed in claim 9, characterized in that the dependency of the decision on the random function is reduced on the basis of the number of cycles (n).
- 20 11. The method as claimed in one of the preceding claims, characterized in that a design (10, 10a) has a grid dimension chosen for it which is equal to the width of a mask writing beam which is used for transferring the design (10, 10a) onto a lithographic
25 mask,
- or in that a design (10, 10a) has a grid dimension chosen for it which is less than the width of the mask writing beam.
- 30 12. A data processing installation (550) for automatically altering design data for producing a component, particularly an integrated circuit arrangement,
- 35 having a memory unit (552) for storing design data which are to be altered and stipulate a geometrical

design (10) which is to be altered for a component,

having a change unit (554) which uses the design data
to produce altered design data for an altered design
5 (10a) and stores them in the memory unit (552),

having an assessment criterion ascertainment unit (558
to 562) which ascertains an assessment criterion (GBM)
from the altered design data,

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having a comparison unit which compares the assessment
criterion (GBM) for the altered design (10a) with an
assessment criterion for the design which is to be
altered,

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and having a control unit (572) which retains the
unaltered design data or replaces them with the altered
design data depending on the comparison result,

20 and which automatically prompts the performance of a
plurality of cycles of alterations, comparisons and
decisions about replacement.

13. The data processing installation (550) as claimed
25 in claim 12, characterized by at least one further unit
whose operation involves carrying out a method as
claimed in one of claims 1 to 11.

14. A program or data store having a program which
30 contains a command sequence whose execution by a
processor (600) involves carrying out a method as
claimed in one of claims 1 to 11.

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Abstract

Method for altering design data for producing a component, and associated units

The document explains a method in which design data are prescribed which stipulate a geometrical design (10) for a component. The design is used to produce an altered geometrical design, for example through relocations in a region (100). For the two designs, assessment criteria are ascertained and compared. Depending on the comparison result, the unaltered design data are retained or are replaced with altered design data. This method is carried out for a plurality of cycles in succession in order to optimize the design.

(Figure 1B)